2023 INTERNATIONAL CONGRESS OF ACTUARIES
28 MAY – 1 JUNE 2023 · SYDNEY

Actuaries Institute Australia

International Actuarial Association
Association Actuarielle Internationale

Call in the reserves: How actuarial thought is being deployed across the social sector

Prepared by Hugh Miller

Presented to the
2023 International Congress of Actuaries
28 May – 1 June 2023

Institute of Actuaries of Australia
ABN 69 000 423 656
Level 2, 50 Carrington Street, Sydney NSW Australia 2000
t +61 (0) 2 9239 6100 **f** +61 (0) 2 9239 6170
e actuaries@actuaries.asn.au **w** www.actuaries.asn.au

Abstract

Over the past decade Australia and New Zealand have seen a substantial increase in actuaries across the social sector, spanning areas such as welfare, employment, justice, housing, homelessness and child protection. Government Departments such as the NZ Ministry of Social Development, the Australian Department of Social Services and the National Disability Insurance Scheme have teams of actuaries plying their trade. Part of the trend reflects an increasing emphasis on data and evidence-based policy, but there also appears to be some distinctive factors that have suited the actuarial skillset.

In this paper we:

- Give an overview of some of the areas where actuarial modelling has been making a difference
- Describe the technical skills that have been important in working in the social sector
- Provide examples of results from social sector work, drawing particularly from the author's experience in welfare, homelessness and child protection.

It will also include some reflections on the appropriateness of the actuarial skillset, the opportunities for further expansion of actuarial thinking and what challenges remain.

1 Introduction

One exciting aspect of the actuarial profession has been its growth into non-traditional areas. People with actuarial backgrounds are finding their skills valued across diverse areas such as logistics, climate change policy and customer loyalty. Even within more traditional areas of financial services actuaries are increasingly involved across adjacent parts of the business, such as artificial intelligence applications, telematics, customer value and marketing analytics.

One area where growth into non-traditional areas has been particularly evident in Australasia over the past couple of decades is the 'social services', predominantly around government services that support vulnerable people in our communities. For the purposes of this paper, social services are defined broadly and covers areas such as welfare, employment, housing & homelessness, education, justice, child protection, disability and public health. Actuaries have had substantive involvement in all these areas in Australasia over the past two decades. In contrast to financial services, there is generally no obligation to seek actuarial advice in these areas, so this demand for services is intrinsic – departments recognising the value that can be added.

This paper is a gentle and general introduction to some of these applications of actuarial work, drawing from the Australasian experience. It is a survey of existing work, rather than attempting new research. We go into some detail of each example to give a flavour for the nature of the work and the insights produced. We believe that bringing examples and themes together in this paper represents a useful contribution to actuarial practice. The selection of examples is heavily biased, being skewed towards areas the author has been involved with.

2 A (very) selective historical perspective

It is useful to consider the history of actuarial work for government, and the extent to which this has extended into social sector work. While difficult (likely impossible) to construct a comprehensive list of actuarial advice to government applying to the social sector, examples do exist.

The United Kingdom

Much actuarial advice has been delivered to government by the Government Actuary's Department (GAD), part of the civil service and established in 1919. More detailed accounts of the Department's evolving role are included in Maddex (1954) and Daykin (1992, 1999, 2001), with the latter most relevant to social sector considerations. While some activity might be considered traditional (such as the management of defined-benefit pensions, development of life tables, etc), this has naturally extended to areas of social security policy:

- Social security payments require **population projections**, which were regularly prepared by GAD from 1954, before eventually moving to the Office of National Statistics. Population work also extends to mortality tables, which have significant uses in other GAD work.
- **National Insurance**, has existed in some form since 1911. Historically much of social security payments operated on a contributory basis, requiring employee contributions to be set and reserves monitored. Actuaries have played a key role in the design of these contributory schemes. For instance, the Beveridge Report (Beveridge, 1942), which laid the groundwork for the post-war welfare state in the UK, had a substantial appendix from the government actuary (George Epps) working through financing and transitional arrangements attached to the proposal.

North America

Compared to other English-speaking western countries, Canada and the USA still rely more heavily on contributory models of social security – money is collected (e.g. from employer payrolls) to fund current or future benefit payments. This funded nature has natural led to greater need for management and actuarial thought. There are prominent actuarial roles for the management of social security arrangements. For example the United States Office of the Chief Actuary manages contributory unemployment schemes, but also costs general-revenue programs such as the Supplemented Security Income. Many state governments similarly have actuarial offices.

In Canada, the Office of the Chief Actuary provides review of the future costs of the different pension plans and social programs that fall under its responsibility, including the Canada Pension Plan (CPP), the Old Age Security Program and the Canada Student Financial Assistance Program.

This links back to the profession's history in North America. Early actuarial work[1] focused on life insurance, with a growing practice in pensions (notably led by George A. Huggins in Philadelphia and George B. Buck in New York City) which led to contributory social security work in the 1930s. Health insurance advice developed quickly in the 1950s, given the relative prominence of private insurance in the USA market. More information can be found in Moorhead (1989).

Australia

- In Australia, many State governments had internal actuarial functions, often established before federation into a unified country. These functions provided actuarial modelling, usually in traditional areas such as the management of friendly societies, defined benefit pensions and the like. Examples of early state-level offices include:
  - The Victorian Office of the Government Statist and Actuary, established in 1893
  - Herbert Gouge was appointed as the first government actuary in South Australia in 1894

  Most state-level actuarial offices have closed from the 1980s onwards. We have not found much evidence that early work extended into broader social service areas, but did included the collation of statistical information such as life tables.
- At the Commonwealth level, the Australian Government Actuary has provided internal advice to government for about 100 years.
  - The early years reflected a wide remit across statistics, actuarial and economic work. Charles Wickens become Commonwealth statistician in August 1922 which was later renamed

[1] https://www.soa.org/about/historical-background/

'Commonwealth statistician and actuary' (Lancaster, 1974). Notable 'actuarial' work included social insurance and Commonwealth superannuation. However Wickens also made substantial contributions in economics (the basic wage and trade policy; see Hawkins 2019) and statistics (setting up population demographic measurement). The role Australian Government Actuary was more formally established in 1938 when Walter C Balmford, a WW1 fighter pilot, came from England to take up the post.

- More recently the AGA has continued to provide internal consulting services. While many areas are traditional, much advice undoubtably broad and varied. For instance, 1988/89 annual report[2] notes work done on sex discrimination and AIDS. More recent work includes supporting the Priority Investment Approach to welfare.

New Zealand

In New Zealand, the earliest actuaries worked for government. Charles Knight was the first full-time employee at Government Life, appointed as an actuary in 1871. Frederick Willian Frankland was actuary to the Government Statistics Department around the same time, and designed the first scheme for national insurance, which ultimately did not proceed.

More recently, actuaries have had prominent roles in the management of the Accident Compensation Corporation, as well as with investment approach work for other departments, such as the Ministry of Social Development.

Summary

Based on our (admittedly limited) research, in the late 19th and early 20th centuries, government actuarial advice was often established, with particular emphasis on issues of pensions, social security benefits (particularly those funded on a contributory basis) and life insurance. In some cases. The weaker distinction between actuaries and other titles such as statistician and economist in those early years meant that those working for government could have relatively broad remits. While in the UK and Australia the internal consultancy function means there is a breadth of advice, it does appear that much modern actuarial advice to government over the second half of the 20th century was heavily skewed towards areas closer to the traditional skillset, such as funded insurance-style schemes. Non-contributory welfare programs sometimes have actuarial oversight too.

More recently, Australia and New Zealand have seen substantial growth in the use of actuaries in social sector settings. Some examples are covered in Section 4. We do not believe that this experience is as common in other countries, although it is highly possible there is work of which we are aware.

3 The value of the actuarial skillset

3.1 Actuarial skills that are valued in social sector work

Much of the actuarial toolkit is useful and relevant to social sector work. We nominate five key elements of the actuarial toolkit below.

Expertise in data work

The growing appetite to make evidence-based decisions manifests in more data collection and analysis. Actuaries have been strong in this area. Key areas of data work that are relevant to social sector work:

- Working at an appropriate level of detail, from aggregate insights through to detailed unit data work and, where required, complex models.

[2] https://nla.gov.au/nla.obj-1928164761/view?sectionId=nla.obj-2008831620&partId=nla.obj-1930486969#page/n52/mode/1up

- Tailoring analysis of data to the context. Sometimes this involves taking evidence from different sources, or creating a bespoke analysis that can answer specific questions.
- Making data insights available through reporting, or dashboarding.
- Advice on the design, collection and management of datasets.

A long-term perspective

Policy and program decisions often involve long-term thinking, considering how short-term decisions might affect people's trajectories over the longer term. Programs are sometimes termed 'investments' to characterise the idea of spending more upfront (e.g. in education and training) in the belief in downstream benefits. This is consistent with a trend towards earlier intervention, attempting to prevent costlier outcomes in the future (e.g. people ending up in the justice system, or children being taken into care).

This approach also reflects a push towards a longitudinal view of people's outcomes. Rather than looking at cross-sectional views of people requiring support at a given point in time, we can instead look at pathways of support and how these pathways can be altered for the better. Such person-centred design is increasingly important in policy settings.

Risk adjustment

The concept of differential pricing of risk is core to insurance work. However, the idea of risk adjustment is often powerful in social sector contexts too. For example:

- People entering active labour market programs might have different barriers to employment and need differentiated support.
- Aged or disability care services might need to scale to the level of functional ability of the individual
- Bail and parole decisions are sometimes made with an explicit consideration of reoffending or absconding risk.

In such cases, risk estimation and differentiated responses to risk can be highly effective in decision-making and resource allocation. Building risk models, with care for ethical and fairness considerations, often underpins such differentiation.

Measurement of change

Determining the effectiveness of a program or policy is a core question for many government departments. But often measurement of program effectiveness is not easy. Background effects might mean metrics are changing, even in the absence of a program; the characteristics of people enrolled in a program might make them hard to compare to those who are not enrolled; people's outcomes may have changed over time, even in the absence of a program; ad statistical noise may be large enough to swamp underlying signals.

A disciplined approach to analysis of change and related monitoring are therefore highly valuable.

Cost and benefit modelling

Formal cost-benefit analysis is often used to evaluate a given policy or program. More generally, being able to quantify even one side (the benefits of a new government program) is powerful. Being able to take a holistic approach to such modelling enables a broad range of factors to be considered and combined.

3.2 Actuarial skillset compared to other disciplines

One significant challenge is that none of the five skills, individually at least, are unique to actuaries. Data scientists can work with data; economists are experienced in cost-benefit work. And indeed, in many cases a government department will be ambivalent between a project being delivered by other professionals.

So is there any unique service offering from actuaries? We believe there is. First, actuaries generally better cover the range of areas nominated above. Furthermore, actuaries have a reputational for robust independent advice, governed by professional standards. These factors favour the use of actuarial input.

4 Some examples

In this section we provide examples of social sector work that have had significant actuarial involvement. We also highlight how the skills in Section 3 translate to these examples.

4.1 The investment approach

- ✓ Expertise in data
- ✓ Long-term perspective
- ✓ Risk adjustment
- ✓ Measurement of change
- ✓ Cost and benefit modelling

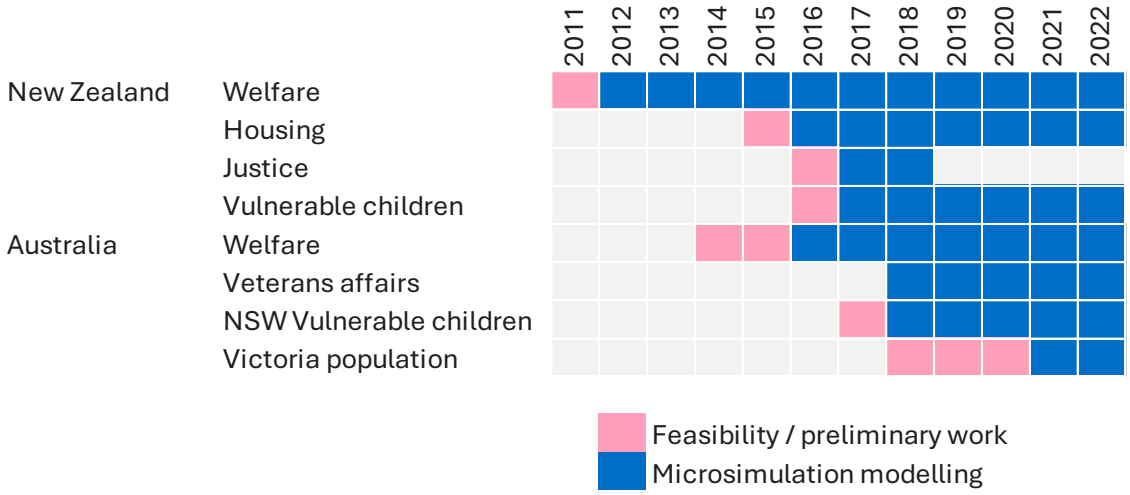
The 'investment approach' is terminology that has been adopted in Australasia for taking a long-term view. In the words of Former New Zealand Prime Minister Bill English[3]:

"At its core, social investment is a more rigorous and evidence-based feedback loop linking service delivery to a better understanding of people's needs and indicators of the effectiveness of social services.

- *This needs to take account of the **long-term** – including those benefits that might take years to be delivered*
- *There will also be more **systematic measurement of the effectiveness** of services people are currently receiving*
- *This information can then be used to **do more of what works – and stop things that don't**."*

Somewhat accidentally, the investment approach has also become synonymous with detailed microsimulation work. These are typically models built, with actuarial involvement, that project people forward across service use at an individual level. A summary of some models in Australia and New Zealand are shown in Figure 1; it shows that most remain in active development. Many of the jurisdictions publish reports to provide transparency around the model and results[4].

Figure 1 – Summary of a selection of microsimulation models support investment-approach work



[3] https://www.beehive.govt.nz/speech/speech-treasury-guest-lecture-series-social-investment

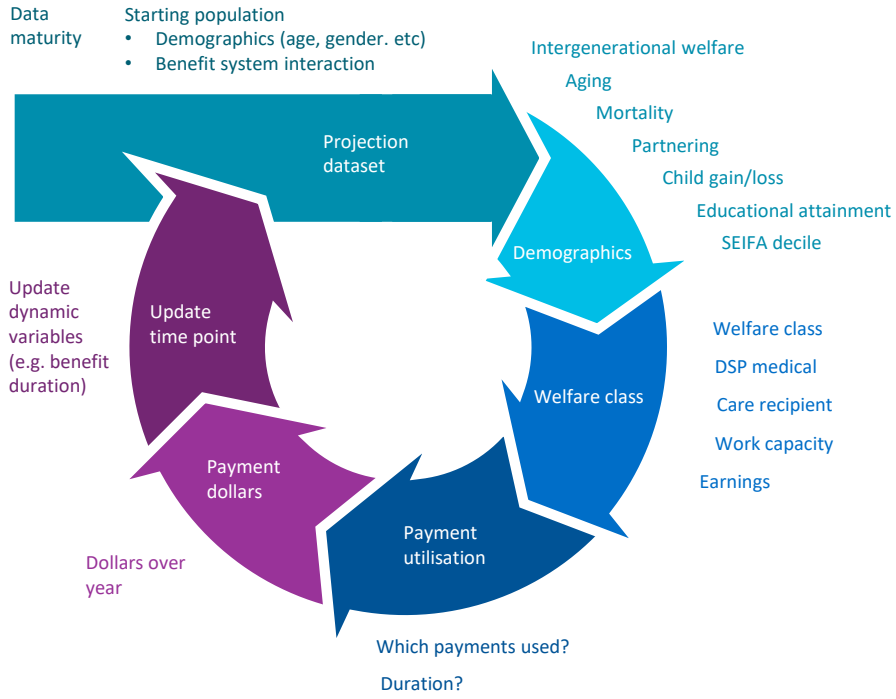
[4] Examples include:

- Commonwealth welfare reports, https://aga.gov.au/publications/pia
- NSW Vulnerable children, https://www.nsw.gov.au/community-services/investment-approach-for-human-services
- New Zealand Benefit and housing reports https://www.msd.govt.nz/about-msd-and-our-work/work-programmes/modelling/index.html

The technical design of these models is generally a series of component models that calculate transition probabilities for outcome variables (e.g. welfare status). this is akin to a Markov model, although the component models might be complex models involving dozens of input variables, so much more complex than ordinary Markov models built on transition matrices. These models are combined to simulate forward each period. An example of the projection for the Commonwealth Welfare model, as is shown in Figure 2.

The scale of the models will depend on the purpose of the model and the number of service areas that are built in. For example, the Australian welfare model focuses just on welfare data, whereas the (state-level) New South Wales (NSW) investment model incorporates linked data across child protection, housing, hospitals, mental health, pharmaceutical, welfare and justice.

Figure 2 – Example microsimulation update cycle, Australian PIA (welfare) model

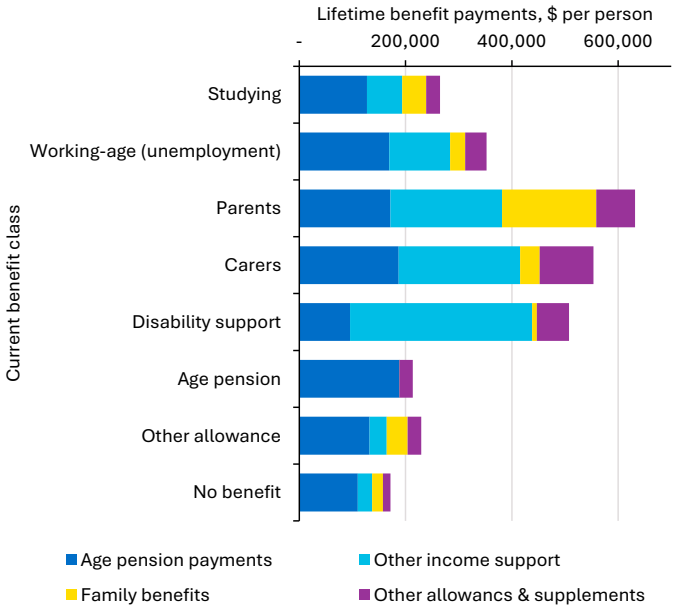


Source: Based on Priority Investment Approach 2020 Valuation Report, AGA

At their best, these provide long-term estimates with almost infinite depth and divisibility. Figure 3 and Figure 4 respectively show cohort-level averages and system-level analysis of change from the 2020 report, published by the Australian Government Actuary (AGA). Since simulations are performed at the individual level, detailed results could be generated for arbitrary cohorts defined by characteristics built into the model.

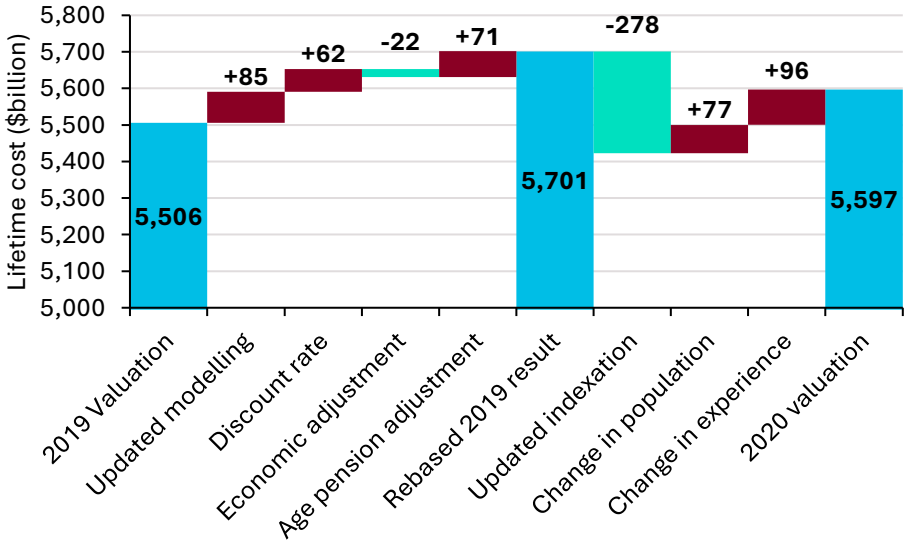
Emphasis on model applications will vary too. Some models include system-level insights, whereas others are more focused on building investment cases at an individual or cohort level.

Figure 3 – Average lifetime welfare benefits by current benefit class and future benefit type, Australian PIA (welfare) model



Source: Priority Investment Approach 2020 Valuation Report, AGA

Figure 4 – Example analysis of change, Australian PIA (welfare) model



Source: Priority Investment Approach 2020 Valuation Report, AGA

The role of the investment approach has not been without some controversy, and an entire book has been written debating key ideas (Boston & Gill, 2017). One criticism has been the risk of treating long-term service use as a 'liability', which takes a deficit approach to government support and could potentially encourage cost-cutting. Another is around the focus on fiscal costs, without necessarily focusing on broader economic costs and benefits.

The models themselves are also of significant technical interest, raising new research questions. Transition models have the potential to be unstable, or interact poorly with other component models, so significant checking and validation is needed. Treatment of issues such as missing values, latent characteristics or household status all require careful consideration.

4.2 Social impact investments

- ✓ Expertise in data
- ✓ Long-term perspective
- ✓ Risk adjustment
- ✓ Measurement of change
- ✓ Cost and benefit modelling

The Australian Treasury defines social impact investment as '*an emerging, outcomes based approach that brings together governments, service providers, investors and communities to tackle a range of social issues.*'

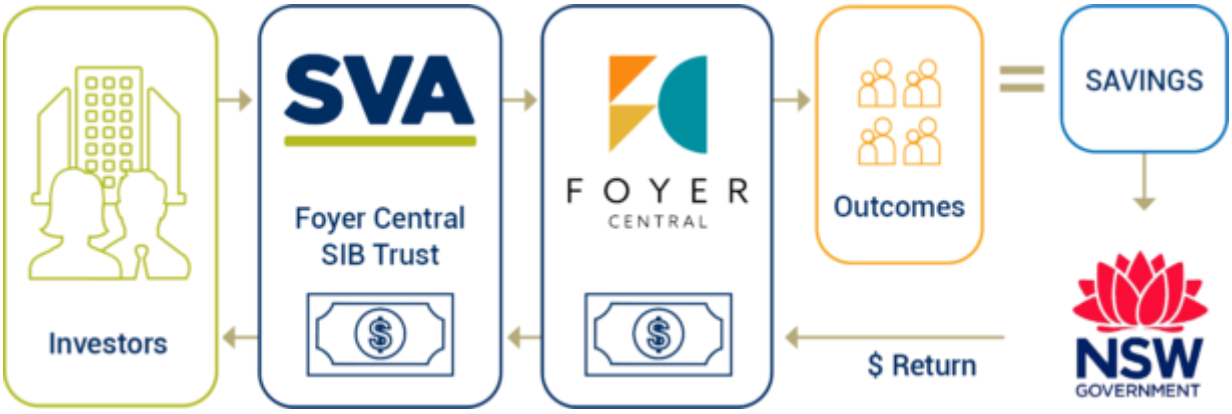
Two key examples of social impact investments are Social Impact Bonds (SIBs) and Payment by Outcomes (PBOs). We give a brief example of each.

Foyer Central Social Impact Bond

The Foyer program is a program designed for young people (aged 18-22) assessed as at risk of homelessness who have a lived experience in out-of-home care (OOHC). The program providers young people safe and affordable accommodation while they develop skills to progress towards independence.

The 'bond' aspect reflects that private investors have contributed to the program. Outcomes are measured as part of the program. A participant is successful if they have no negative outcomes (child protection, prison, or excluded accommodation use) during and after accommodation support, plus a positive outcome (housing, income or education) in the 12 months after leaving Foyer accommodation. Investor returns (interest and principal) are determined by the success rate of the program over the year 2023 to 2030. A schematic of the bond design is shown in Figure 5.

Figure 5 – Schematic of the setup of the Foyer Social Impact Bond



Source: Foyer Central Social Impact Bond, annual investor report 2022, SVA

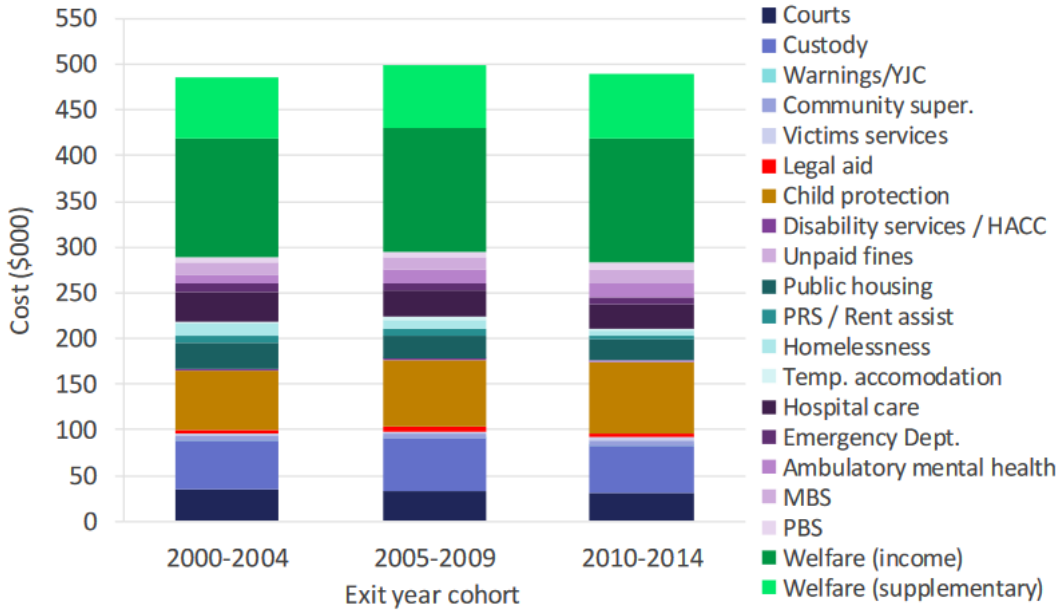
The design of the bond was supported by a linked data analysis that highlighted the poor outcomes and costs for those leaving OOHC[5]. Fiscal costs associated with OOHC leavers were modelled and estimated to be $496,000 over 20 years. The model was built on a dataset of 17,000 OOHC leavers (about 1,000 per year over a 17-year period), linking data across justice, health, housing, welfare, child protection, disability services and legal aid.

Figure 6 shows the distribution of future cost across different services. It shows high levels of fiscal cost associated with welfare (42%), child protection costs for the children of leavers (14%) and combined custody and court costs (18%). This high cost also translates into poorer life outcomes. For instance, 40% of the cohort had already interacted with homelessness services in the data – even before projection.

Figure 7 shows the variation in cost across some statistically-defined segments. It shows that court appears or time in custody are strongly predictive of higher cost, reflecting elevated risk of justice interactions in the future. It also shows higher costs for Indigenous peoples (already an overrepresented group in the dataset), reflecting entrenched disadvantage and other barriers that they face.

[5] https://www.osii.nsw.gov.au/assets/office-of-social-impact-investment/OOHC-leavers-phase-3-external.pdf

Figure 6 – OOHC leavers projections: average 20-year cost of service usage by exit year cohort, by service usage type



Source: Miller & Dixie, 2018

Figure 7 – Segmentation of OOHC leavers with differing future costs

Segment	Child of leaver in OOHC care prior to leaver's exit	Indig-enous	Gender	Court appearance in year of exit, prior year OR custody in year of exit	Population	Avg. NSW 20yr cost ($000)	Avg. Cmwth 20yr cost ($000)	Avg. total 20yr cost ($000)
1	No	No	Female	No	5,283	166	259	425
2				Yes	561	322	300	621
3			Male	No	4,511	149	191	340
4				Yes	1,436	460	210	670
5		Yes	Female	No	1,652	292	240	532
6				Yes	313	622	297	919
7			Male	No	1,137	343	167	510
8				Yes	628	984	191	1,175
9	Yes	No			107	862	305	1,166
10		Yes			57	1,170	278	1,447
11		Missing court data			594	241	264	504
Total					**16,279**	**269**	**227**	**496**

Source: Miller & Dixie, 2018

The research and investment in care for OOHC leavers has also likely had an indirect influence on broader policy development. In late 2022 NSW announced OOHC financial support would extend up to age 21, meaning that the expansion now applies to all states and territories in Australia.

Disability Employment Service and Payments by outcome

One of the larger suite of PBO programs in Australia relates to employment services. Both the service for people without disability (Workforce Australia) and for people with disability (Disability Employment Service, or DES) are delivered by a network of third-party providers that are paid by government to support people into employment. Both programs dedicate a large fraction of payments to employment-

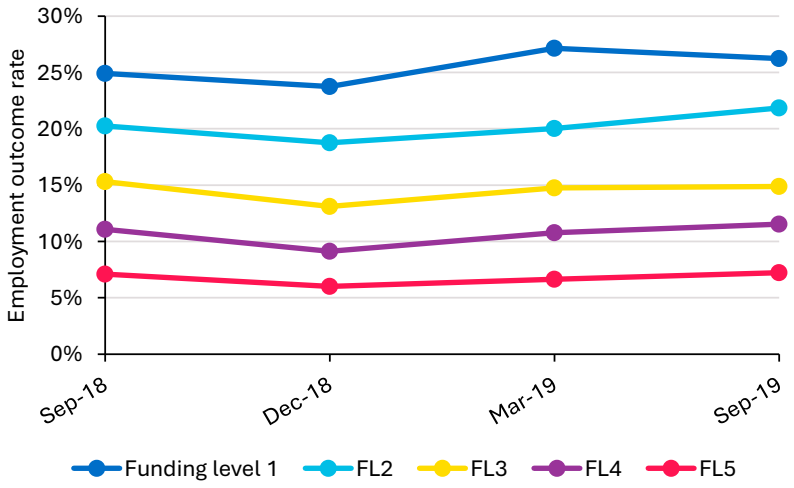
based outcomes. These are geared towards sustained employment, rather than simply placement – largest outcome payments typically occur once a jobseeker sustains a job for 26 weeks.

The DES program is particularly noteworthy because it makes use of a risk-adjusted funding model to distribute the $1.4 billion in annual program costs to providers. This funding model first scores people based on factors associated with barriers to employment, effectively predicting the relative likelihood of achieving employment outcomes. Thresholds are applied to divide scores into five bands, with higher outcome payments attached to people with more barriers to employment. The scoring model recognises many factors[6], including:

- Demographic characteristics – age and gender
- Duration variables, such as time since first starting in DES
- Labour market effects such as regional internet vacancy index (IVI) and the change in the national unemployment rate
- Job Seeker Classification Instrument (JSCI) score which is a composite of various barriers collected from a jobseeker survey
- Disability type indicators
- Other program characteristics – this includes benchmark hours, eligible school leaver, current funding level and job-in-jeopardy flags, including the allowance or benefit received by the jobseeker
- Barrier and Condition flags – Over 300 indicator variables related to specific employment barriers and conditions for the jobseeker.

Differentiation in outcome rates post-implementation are shown in Figure 8. Large gaps are visible between funding bands, reflecting the heterogeneity of the jobseeker population with disability. The outcome rate for funding level 1 (those with least barriers) is about four times that of the lowest funding band.

Figure 8 – Probability of achieving a 13-week employment outcome in a nine month period, by finding level



Source: DSS, https://www.dss.gov.au/sites/default/files/documents/foi/05_2021/foi-2021-090-document.pdf

The use of risk-adjusted funding bands attempts to solve issues analogous to community rating in insurance. If provider outcome fees were the same for all jobseekers, then there is a risk of 'parking' (providers provide limited effort for those with larger barriers to employment) and 'creaming' (providers focus on those with low barriers to employment), creating suboptimal outcomes for people in the program.

[6] https://www.dss.gov.au/sites/default/files/documents/06_2018/des_risk_adjusted_funding_model.pdf

4.3 Quantitative evaluation

- ✓ Expertise in data
  Long-term perspective
- ✓ Risk adjustment
- ✓ Measurement of change
- ✓ Cost and benefit modelling

Evaluation of programs and policies is fundamental to building the evidence base to allow governments to do more of what works. Evaluation often involves qualitative and quantitative elements. Both are critically important and are complementary, however we focus on quantitative evaluation, where actuarial skillset more naturally applies.

As an example, we look at the evaluation of the Rent Choice program. This is a private rental subsidy in NSW that can extend for up to three years, which serves as an alternative to public or community housing in cases where people can reasonably be expected to progress towards housing independence. The program averages about 1,000 approvals per quarter.

A linked dataset is available with service use across a range of services, as well as data for other people interacting with NSW housing supports. This allows for the development of a comparison group and a method for comparing relative improvements:

- A comparison group is selected from people making applications for housing support. These people would receive other, more traditional supports, such as being put on the waitlist for public housing. A propensity model was fit to provide (probabilistic) matching across income, district, age, current accommodation status, Aboriginal identification, gender, disability and homelessness status.
- For Rent Choice and comparison groups, we can compare the outcome rate prior to Rent Choice entry (or prior to housing assistance application) to the corresponding rate afterwards – in the results below we look at outcomes in the second year after entry/application. By looking at the difference in the changes for each group ('difference in difference') we can look at relative effect.

Importantly we note that even if the difference-in-difference was close to zero, this would still represent a strong positive result. This is because Rent Choice is a cheaper and more flexible program to deliver, so achieving the same outcomes as the public housing system is good. More broadly, reasonable outcomes combined with an at-capacity public housing system means that Rent Choice can relieve pressure on the public housing system and ensure places are available for other vulnerable people.

Outcomes are expected to be published soon, which would track outcomes over housing, homelessness, income support, courts & prison, and health services.

As shown in the example, quantitative evaluation also benefits from good experimental and quasi-experimental design, to ensure that measured changes are genuine estimates of program impact. Miller (2021) providers further examples of causal modelling and quasi-experiment design. Good design enables answers to more tailored questions to be addressed.

Outcomes can also be translated into economic costs and benefits. Overall, the two come out fairly similar; the largest component of benefits are reduced public housing costs, and this is only rated as a 15% reduction in the difference in difference analysis. To put another way, many in the comparison group remain on the waiting list for a house and this is 'cheap'. An alternative view (where a person is given priority access to public housing) would see a very large cost-benefit ratio.

The example shows a combination of data work, Risk-adjustment (via propensity matching), and careful measurement of change facilitates quantitative evaluation.

4.4 Economic benefits and costing

- ✓ Expertise in data
- ✓ Long-term perspective
  Risk adjustment
- ✓ Measurement of change
- ✓ Cost and benefit modelling

Estimation of economic costs and benefits, including the application of cost-benefit analysis, is often treated as an economics speciality. However, the increasing sophistication on the use of data and longitudinal modelling means that actuaries are also well-suited to similar projects. As a final example, we provide the example of economic costing work undertaken for the

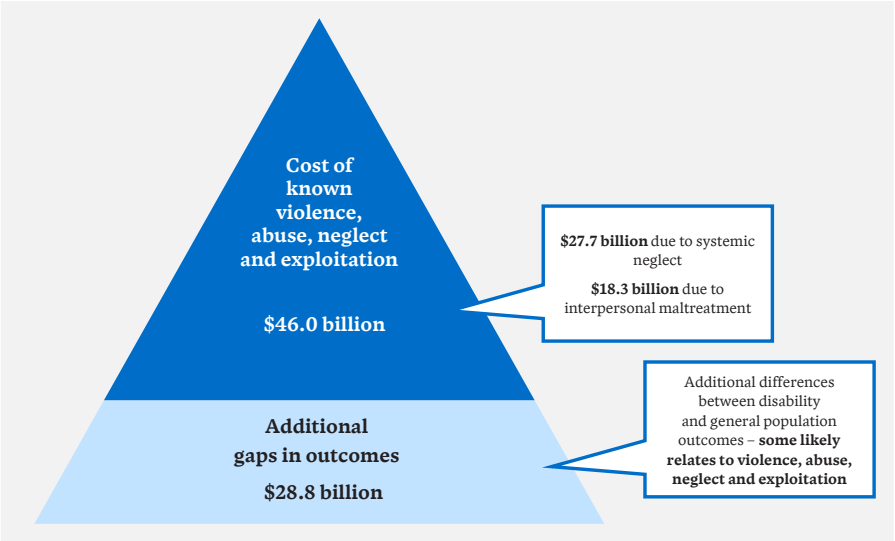
Royal Commission into Violence, Abuse, Neglect and Exploitation of People with Disability ('Royal Commission'). The Report[7] into the economic cost of maltreatment of people with disability (Vincent et al., 2022) was a key research project, with author involvement, that demonstrated that what is often a personal cost also translates into a large economic one, bolstering the case for reform.

Economic cost models are often boiled down to big figure headlines – in this case, the $46 billion annual cost associated with violence, abuse, neglect and exploitation of people with disability. However, the value of the work is in the component pieces and the work required to bring them together. Some key aspects:

- Unlike similar studies (such as the cost of violence against women and children, KPMG 2016), the Royal Commission is interested in both interpersonal maltreatment (such as when a person commits an act of violence against a person with disability) and systemic neglect (such as when support systems in employment, housing or healthcare failure to meet the needs of people with disability). Systemic neglect is difficult to measure – there would likely be some level of differences in outcomes between people with and without disability even within systemic neglect, so apportionment is important. In our project we produced a 'core' estimate of $46.0 billion, but also highlighted another $28.8 billion relating to outcome gaps where it was likely some was related to maltreatment. This is shown in Figure 9.
- There is a large component relating to 'non-market' costs, in addition to actual dollars paid or forgone by governments, communities or people with disability. These non-market costs include premature death, lower quality of life through disease and lower subjective wellbeing.
- The cost estimates can be broken down across domains, shown in Figure 10. Health represents the largest domain, due to high costs of premature death and poor health. Costs in the employment and financial security domain are also high, with maltreatment one factor leading to low employment rates among people with disability.
- The costs are attached to significant volumes of poor outcomes. Examples include:
  - 43,000 quality-adjusted years of life are lost each year due to deaths and ill-health resulting from interpersonal violence, abuse, neglect and exploitation.
  - 73,000 quality-adjusted years of life are lost due to deaths and ill-health resulting from elevated rates of smoking and poor diet.
  - 43,000 people with disability don't participate in the labour force due to systemic failures and neglect, and correspondingly 60,000 additional people with disability receive income support (such as the Disability Support Pension).
  - 6,600 adults with disability are in detention in 2021-22 as a result of increased risk of detention for victims of child abuse or neglect.
  - 554,000 people with disability are denied access to accessible housing.
  - 23,000 fewer people with disability complete year 12 each year due to low expectations and bullying.

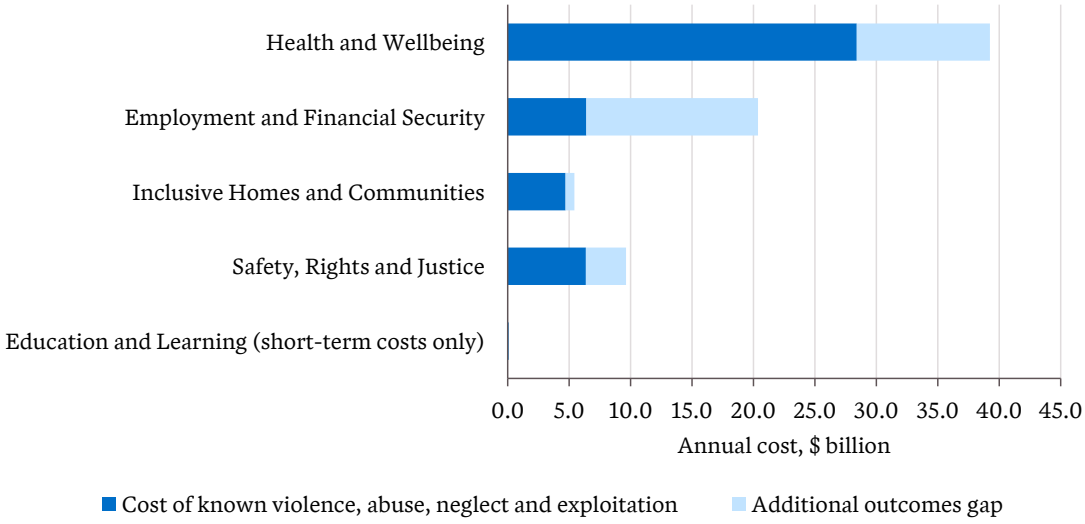
[7] https://disability.royalcommission.gov.au/publications/economic-cost-violence-abuse-neglect-and-exploitation-people-disability

Figure 9 – Components of core cost and additional outcomes gaps in the Royal Commission estimate



Source: Vincent et al., 2022

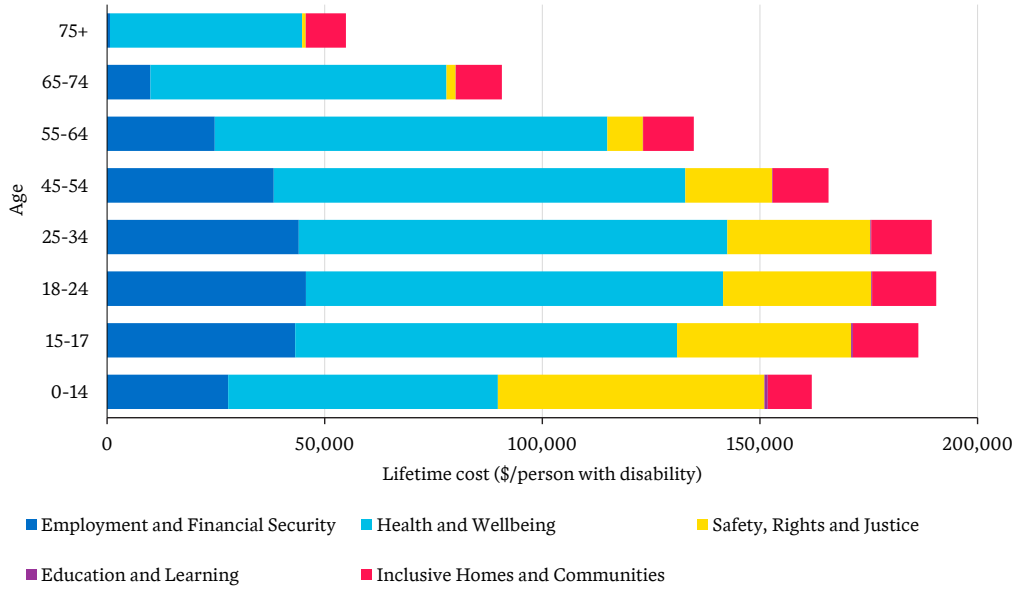
Figure 10 – Cost of maltreatment split across modelled outcome domains



Source: Vincent et al., 2022

In addition to annual cost, we create tailor by age so that we can derive lifetime costs for different (current) age cohorts, shown in Figure 11. The figure also reflects that the type of maltreatment costs vary with age.

Figure 11 – Lifetime cost of violence, abuse, neglect and exploitation of people with disability by age



Source: Vincent et al., 2022

Costings of this type are often of done by economists (and indeed this one was a partnership between actuaries and economists). Some elements that are more distinctively actuarial that were valuable included:

- Mortality and morbidity – understanding the rates of premature death and illness, and the extent to which this is attributable to maltreatment, was a key part of the project.
- Lifetime cost – Understanding how costs vary by age enables a lifecourse perspective on maltreatment.
- Differentiation – and other factors like gender, First Nations status and disability type,
- Data work – At a technical level, the project involved combining disparate data sources as well as stakeholder consultation. The work included detailed analysis and modelling of survey data (to understand experiences of maltreatment and differences for people with disability), and drawing on other linkage work to model service interactions.

5 Final thoughts

Actuaries are used to the idea of serving the public interest, are respected for rigour and independent thinking, and carry a skillset well-suited to modern social sector work. It is therefore a natural expansion into social sector work, and it has been a privilege to work across a range of fascinating projects.

Some further personal reflections based on our experiences in the sector:

- **The value of partnerships and working collaboratively –** the actuarial skillset is valuable but will have natural limits. Partnering with other experts such as qualitative evaluators or economists can make the move into broader work easier. The examples of section 4 included a few partnerships:
  - The evaluation of 4.3 was a mixed method evaluation – we partnered with an evaluation company who undertook qualitative components, and an economist for advice on economic evaluation components.
  - The Royal Commission project was a partnership between an actuarial and an economics firm. While we found some overlaps in skill sets, much was complementary.

- **The value of curiosity and reading –** One advantage of the social sector is that most areas are well-studied, with a good supply of academic papers, textbooks and grey literature. For the interested reader, this offers a great opportunity to gain knowledge and fluency in an area quickly.
- **The value of publishing publicly –** Relatedly, it has been our experience that having our work published publicly has been a good thing. For governments, it is a way of increasing transparency in a way that encourages informed debate in policy areas. Non-government organisations can benefit through access to data and insights, allowing them to better design their activities. And other governments, and the public generally, benefit from the broadening evidence base.
- **Implications for actuarial education –** We have sometimes been asked whether actuarial education could be altered to better support actuaries would want to work in diverse areas, including the social sector. The actuarial syllabus is already quite full, so we are reluctant to suggest too much – particularly since we argue the existing skillset is already well-suited to many applications. Certainly the current focus on applied data handling, modelling and coding skills remain relevant. Likewise communication skills for non-technical audiences remains relevant. Additional possibilities include:
  - **Awareness and case studies.** Some social sector work lends itself well to case studies as they are public. It is common to integrate case studies into subjects, and this can continue.
  - **Research skills.** Since much of our social sector work constitutes research to expand the evidence base, being able to explore past research well is an important skill. This is certainly core
  - **Causal reasoning.** Skills around experimental and quasi-experimental design are broadly applicable – businesses as well as government are interested in the 'why'.

Finally, we also recognise the enduring challenges of the social sector. The Beveridge report identified the 'five giants', big areas of need that needed government support – idleness, ignorance, disease, squalor and want. These are solved through interventions in employment, education, health, housing and income support respectively. We still live in countries with large disparities that mean significant challenges remain across all these areas. Most important still are 'wicked' policy areas where disadvantage across multiple areas compounds. For the immediate future, there remains much to be done in policy innovation that addresses these long-standing giants.

6 References

- Bellis, C. (1997). The future-managers: actuaries in Australia 1853-1997. Institute of Actuaries of Australia.
- Beveridge, W. (1942). Social insurance and allied services (Vol. 942). HMSO: London.
- Boston, J., & Gill, D. (Eds.). (2017). Social investment: A New Zealand policy experiment. Bridget Williams Books.
- Daykin, C. D. (1992). The developing role of the Government Actuary's Department in the supervision of insurance. Journal of the Institute of Actuaries, 119(2), 313-343.
- Daykin, C. D. (1999). The regulatory role of the actuary. British Actuarial Journal, 5(3), 529-574.
- Daykin, C. D. (2001). The role of the Government Actuary's Department in social security in the United Kingdom. British Actuarial Journal, 7(5), 765-790.
- Hawkins, J. (2019). Charles Wickens: The Australian Government's First Economist. History of Economics Review, 73(1), 85-96.
- KPMG (2016) The cost of violence against women and their children in Australia. Accessed March 2023 at https://www.dss.gov.au/sites/default/files/documents/08_2016/the_cost_of_violence_against_women_and_their_children_in_australia_-_final_report_may_2016.pdf
- Lancaster , H. O. (1974). CHARLES HENRY WICKENS: 1872–1939. Australian Journal of Statistics, 16(2), 71-82.

- Maddox, G. H. (1954). The Government Actuary's Department. Journal of the Institute of Actuaries, 107-111.
- Miller, H. (2021). Lost cause: Getting at causation in our datasets. Presented at the 2021 Injury & Disability Schemes Virtual Seminar. Available at https://actuaries.logicaldoc.cloud/download-ticket?ticketId=0ee592cf-06a1-495b-91d9-44384361116b
- Miller, H. and Dixie, L. (2018). Analysis of future service usage for Out-of-Home-Care leavers. For the NSW Office of Social Impact Investment, available at https://www.osii.nsw.gov.au/assets/office-of-social-impact-investment/OOHC-leavers-phase-3-external.pdf
- Moorhead, E. J. (1989). Our yesterdays: the history of the actuarial profession in North America, 1809-1979 (p. 307). Schaumburg, IL: Society of Actuaries.
- Vincent, J., McCarthy, D., Miller, H., Armstrong, K., Lacey, S., Lian, G., Qi, D., Richards, N., Berry, T. (2022). Research Report - The economic cost of violence, abuse, neglect and exploitation of people with disability. Taylor Fry.